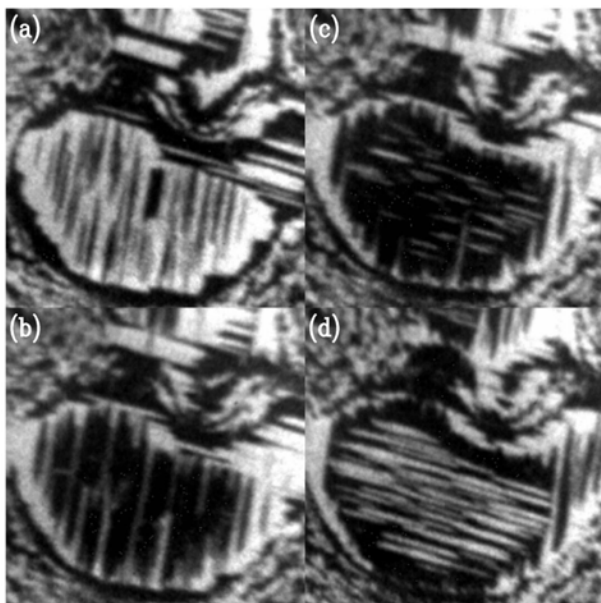


LEEM Study of Indium Etching of Si(001)



- Low-energy electron microscopy has been used to study the adsorption of indium on Si(001) surfaces
- At temperatures below 600°C a variety of indium-related surface structures are found (as previously known)
- Above 600°C, **etching** of the surface is observed, shown here at 650°C with 10 μm field-of-view images acquired with time spacing of 2 min and with incident indium flux of 6 ML/min.

R. M. Feenstra, DMR-9985898, "Nanoscale Structure of Semiconductor Surfaces, Alloys, and Heterostructures" and DMR-0079416, "Acquisition of a Low-Energy Electron Microscope"

We have used LEEM to study the surface structures and surface reactions of indium on Si(001) surfaces. This is the first completed LEEM study to be done with our instrument at Carnegie Mellon University, acquired through an NSF Instrumentation Grant. The results will be published in Surface Science (article in press). The figure shows dark-field images (imaging a half-order diffraction spot) obtained from a relatively large single terrace on the surface. This terrace, starting out as Si(001)2 \times 1, is held at a temperature of 650°C and exposed to an indium flux. We find that the indium, rather than forming adlayers on the surface (as occurs at lower temperatures) now acts to etch the surface. Although a considerable body of knowledge exists regarding low-temperature In-induced surfaces structures on Si(001) (see papers below), the unique capability of the LEEM to provide real-time, in-situ data has enabled us to probe new aspects of this problem relating to the In-induced etching at elevated temperatures.

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A.A. Baski, J. Nogami, and C.F. Quate, Indium-induced reconstructions of the Si(100) surface, Phys. Rev. B 43, 9316 (1991).